Work Plan and Methodology:

Phase wise plan of work achieved.

First Phase :

- Detailed survey of the literature and purchase process and purchase of chemicals etc., required for synthesis.- Three months from the date of registration.

Second Phase :

- Next five to six months, Preparation of components A,B,C,---- required for the synthesis of final products.
- Synthesis or condensation of constituent components by established method with proper purification.

Third Phase :

- Elemental analysis, spectroscopic, characterization, microscopic examination of novel substances.

Fourth Phase :

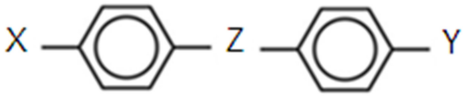
- Research paper writing and publication of research papers.
- Preparation of Synopsis and submission of Synopsis and Thesis.

Preparations:

Liquid crystal substances are synthesize by selecting suitable molecular moiety and by varying central and/or lateral and/or terminal groups, a number of new liquid crystal molecules with two or more phenyl rings and one or more central bridge or bridges can be synthesized.

Synthesis of Homologous series :

Homologous series of liquid crystal substances with general structure



are prepared to synthesized where X and Y are terminal end groups and Z is a central bridge. Mesomorphic properties of new compound will be discussed on the basis of their structural determination by, I.R., ^{1}H-NMR Spectra elemental analysis and transition temperatures as determined by hot stage polarizing microscope.

Preparation of Compounds:

- (a)Synthesis of p-hydroxy cinnamic acid.

  P-Hydroxy cinnamic acid will be prepared by dissolving p-hydroxy benzaldehyde and malonic acid in pyridine to which few drops of piperidine will be added and then it will be heated for a rapid evolution of CO2 take place. The reaction will completed by boiling the solution for five minutes. It will be cooled and poured into excess of water containing enough hydrochloric acid to remove excess of pyridine. The p-hydroxy cinnamic acid will separated and filtered off, wash with water and recrystallized from alcohol several times as white shining crystals. The fine crystals will obtained and it will be melted sharply at their reported melting point 214^0C yield is 69.9 %.

- (b) Synthesis of n-alkyl halides:

  Corresponding purified alcohols will be used to synthesis of n-alkyl halides by standard methods and pure products were obtained, from ethyl to hexyl halide. Transition points are satisfactorily agreed with the reported literature. Higher alkyl halides viz heptyl, octyl, decyl, dodecyl, tetradecyl, hexadecyl, were directly purchased from market and used as received. .

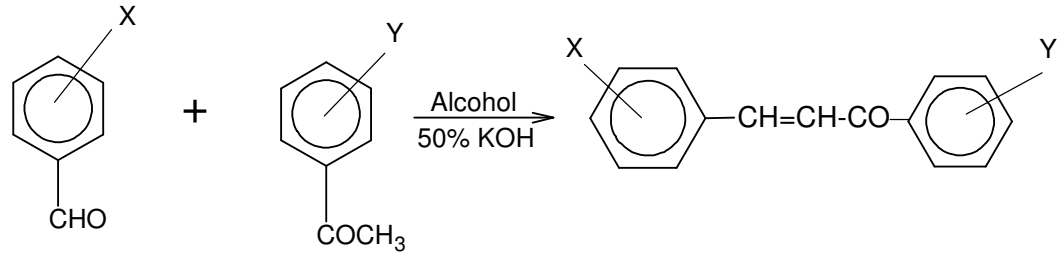
- (c) Synthesis of Cis p-n-alkoxy cinnamic acids:

  Several of methods are known for alkylation of p-hydroxy benzoic acid and p-hydroxy cinnamic acid. P-Hydroxy cinnamic acid were alkylated by the treatment of corresponding alkyl halide with p-hydroxy acid by the modified method of p-Hydroxy cinnamic acid , corresponding alkyl halide and potassium hydroxide were dissolved in methanol and reaction mixture was refluxed for 3 to 4 hours, 10% aqueous potassium hydroxide solution was added and refluxing continued for further two hours to hydrolyzed any ester formed. The solution was cooled and acidified with 1:1 hydrochloric acid to precipitate the corresponding alkoxy cinnamic acids. Time period for refluxing of reaction mixture was extended with increasing alkyl chain length. Cinnamic acids were crystallized from ethanol or acetic acid till constant melting points were obtained.

(d) Preparation of Acid chloride.

Preparation of Styrene Derivatives:

(1)



X-benzaldehyde Y-Acetophenone Styrene derivatives

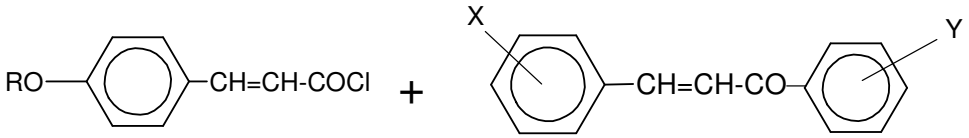
Where X=o,m,p (-NO_2,-OH,-H etc)

Y=o,m,p (-OCH_3,-OH etc)

(B)

Preparation of final product :

(1)



Acid chloride (A)

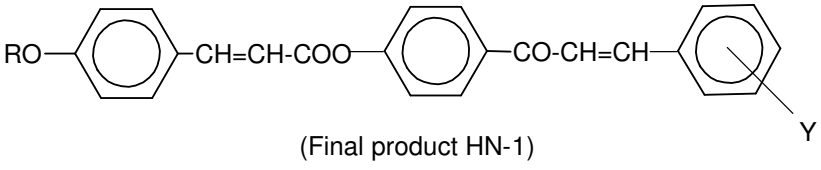
Styrene derivatives (B)

where X = o,m,p -OH

Y = o,m,p -OCH_3

Dry Pyridine Cold

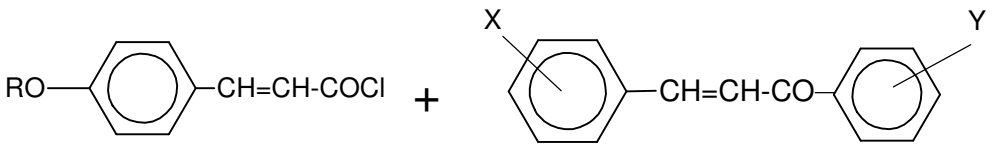
1 : 1 HCl



(Final product HN-1)

where R = C_1 to C_{16}

(2)



Acid chloride
(A)

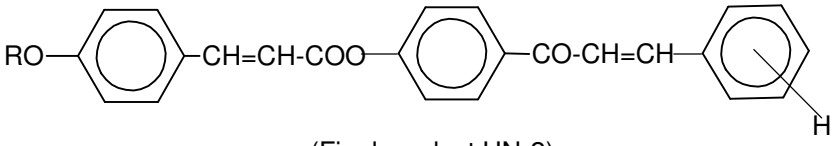
Styrene derivatives
(B)

where X = o,m,p -NO_2

Y = o,m,p -OH

Dry Pyridine Cold

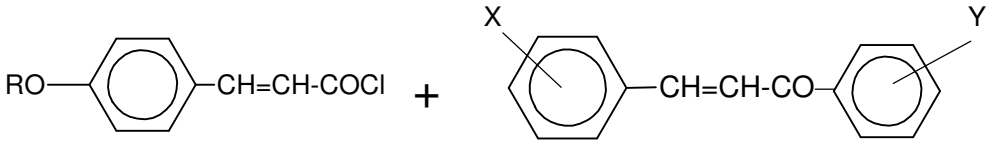
1 : 1 HCl



(Final product HN-2)

where R = C_1 to C_{16}

(3)



Acid chloride
(A)

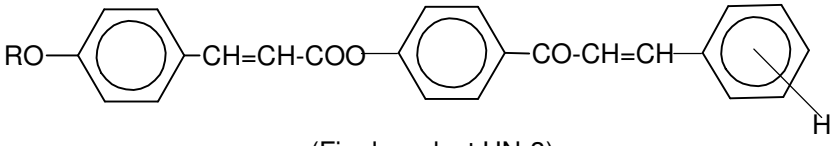
Styrene derivatives
(B)

Where X= -H

Y= o,m,p -OH

Dry Pyridine Cold

1 : 1 HCl



(Final product HN-3)

where R = C_1 to C_{16}